1655

IN THE US PATENT OFFICE

EXAMINER- FORMAN

GROUP - 1655

SN - 09/631,609

FILED - 8/4/00

BY - Tanaami

AMENDMENT

SIRS:

Responsive to the Office Action of 9/10/01, please amend the above as follows:

Claims 11-30, cancel without prejudice

Add claims 31-35, appearing in the appendix attached hereto.

REMARKS

Claims 31-35 are in the application under active prosecution. Claims 1-10 are withheld as being directed to non-elected material and will be cancelled upon allowance of claims 31-35. These claims 1-10 will be the subject of a divisional application to be filed shortly. Claims 11-30 were cancelled to expedite prosecution. The new claims 31-35, were drafted to avoid section 112 problems and to incorporate the Examiner's suggestions, and to more clearly define the invention.

SECTION 102 REJECTIONS OVER HAFF OR BALCH AVOIDED BY NEW CLAIMS

The Section 102 rejections over Haff or Blach are respectfully traversed. New claims 21-35 are not "anticipated" by these references.

Haff shows a capillary thermal cycler wherein a 96 well micro-titer tray 240 is used to store PCR products. This disclosure has no relevance to a "mircroarray" wherein a plurality of capillaries

deposite micromolecules in sites on a substrate. The Haff tray 240 is NOT a substrate. The entire disclosure is directed to producing certain acids which are then stored in the tray 240. The concepts used in our recited invention and the objectives are completely different from Haff.

Blach uses pressure through capillaries to a printer or using electrophoresis force or electroosmotic force. However, our invention does not use electrophoresis or electroosmostic force. In contradistinction, we use a voltage across the capillary holder and substrate so that electric fields act upon the solution inside the capillaries, so that the DNA solution inside the capillaries swell below the capillary bottom end toward the substrate by effect of electric fields, thereby causing droplets of the DNA solution. Blach's concepts are completely different and clearly there is no anticipation.

SECTION 103 REJECTIONS OVER HAFF AND/OR BLACH TRAVERSED.

Our recited invention encompasses amplifying "DNA within said plurality of capillaries by polymerase chain reaction", and using the plurality of capillaries and a voltage applied across the capillar array and substrate" to deposit the biomolecules in the sites on the substrates.

Haff has nothing to do with depositing micromolecules on sites of a substrate using a plurality of capillaries wherein DNA amplification is attained by polymerase chain reaction. All Haff does is deposit DNA for storage into microtiter tray 240.

In further contradistinction, Balch uses pressure to apply prove solution to a printer through capillaries. Electrophosoresis

or electroosmotic force is used. However, Balch cannot deposit a very small amount of prove solution to the printer, as is possible with the instant invention. Without use of our "electric field", applied across the capillary holder and substrate so that the electric field acts upon the solution inside the capillary, there is no swelling of the bottom end of the capillary so that droplets of DNA solution can be minutely deposited at sites on the substrate, as is done in our invention.

Balch's disclosure is completely and mutually exclusive of our recited invention.

Thus, even if either Haff or Balch, singly or in combination, were to be extended, there would still be missing the essential elementsof our invention. Neither of these, even if extended, would make obvious the DNA amplification by polymerase chain reaction in the capillaries and the application of the droplets from the capillaries using electric voltage to the capillaries and substrate to sites on a substrate in a microarray. Both, Haff and Balch are concerned with storage of large amounts of DNA material and printing thereof. Thus, they have no use for nor even consider application of electric field between the capillaries and substrate to enable swelling of the droplets at ends of the capillaries and thus enable mircroarray siting of DNA on a substrate. There is no Sectioin 103 obviousness involved.

In view of the foregoing, applicant respectfully solicits reconsideration and allowance. The Fee calculation Sheet shows no added fee due.

Respectfully

MOONRAY KOJIMA
BOX 627
WILLIAMSTOWN,MA01267

M. KOJIMA
(413)458-2880

WHAT IS CLAIMED IS:

31. A method of producing biochips by depositing micro-molecules in arrays on a substrate, wherein said biomolecules are deposited onto sites on said substrate using a capillary array comprising a plurality of capillaries arranged at the same spacing interval as that of said sites on said substrate and by applying a voltage across said capillary array and said substrate, wherein said biomolecules are contained within said capillary array and are DNA which is amplified within said plurality of capillaries of said capillary array by polymerase chain reaction.

32. The method of claim 31, wherein said polymerase chain reaction is performed by atmospheric temperature change or by heating with laser irradiation.

33. An apparatus for producing biochips by depositing bio-molecules in arrays on a substrate, said apparatus comprising:

capillary holder means for supporting a plurality of capilla-ries arranged at a same spacing interval as that of sites on a said substrate;

means for adjusting a gap formed between said capillary holder means and said substrate by moving either said capillary holder means or said substrate, or both;

means for transferring biomolcules from said plurality of capillaries to said sites on said substrate, said means for trans-ferring comprising voltage source means for applying voltage across said capillary holder means and said substrate so that biomolecules contained in said plurality of capillaries are de-

deposited onto said sites on said substrate; and

means for amplifying DNA contained in said biomolecules in said plurality of capillaries by means of polymerase chain reaction.

34. The apparatus of claim 33, wherein said means for amplifying comprises means for providing said polymerase chain reaction by temperature processing.

35. The apparatus of claim 33, further comprising means for positioning said substrate above or below said plurality of capillaries.

APPENDIX "B"

DOCKET NO. 000807
IN THE US PATENT OFFICE

EXAMINER - Forman
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BY - TAnaami

SIRS:

FEE CALCULATION

I hereby certify that the correspondence upon this notice is placed is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to the Commissioner of Patents Washington, D.C. 20231 on the date set forth below.

MOONRAY KOJIMA, ATTORNEY

DATE: 11/16/01

Document on which fee is calculated:

[ ] Application [xx] Amendment

Entity Status: [x] Non-small entity

[ ] Small Entity; [ ] cert. filed herewith [ ] Cert. filed priorly

APPLICATION

Basic Fee				$
Main claims (-3)	____	x $ ____	=	$
Total Claims (-20)	____	X $ ____	=	$
Multiple Dep. [ ] Yes [ ] No				$
			TOTAL	$

AMENDMENT

	After Amend.		Highst Prior				
Basic Fee							$ 0
(5) Main claims (-3)	2	(-)	2	= 0	X $ ____	=	$ 0
(15) Total Claims (-20)	0	(-)	10	= 0	X $ ____	=	$ 0
Multiple Dep. 1st time [ ] Yes [x] No.							$ 0
						DEFICIENCY	$ 0

FEE DUE $ 0 [ ] Enclosed herewith by check

[ ] Charge to DA 11-1500, duplicate attached.

Respectfully,

M. KOJIMA

MOONRAY KOJIMA
BOX 627
WILLIAMSTOWN, MA 01267
Tel (413)458-2880